

## INTERNET-BASED DATABASE REPORT WRITER AND CUSTOMER DATA MANAGEMENT SYSTEM

### Technical Field

5       The present invention generally relates to  
processing of customer billing and inventory  
information, and more particularly to improvements  
which allow customer access to such information via an  
Internet based connection.

### Background Art

10       Generally, the dramatic growth in use of the  
Internet has created greater opportunities for service  
providers to introduce new services to customers which  
are tailored to take advantage of the increased speed  
and efficiency offered by the Internet.

15       One such area involves processing of  
customer account data relating to services rendered,  
and generating associated billing reports for each  
customer. Of particular concern to the present  
invention is providing access to customer billing and  
20       inventory data to users located both in and outside a  
service provider such as a telephone company.

25       To date, processing and billing arrangements  
rely on traditional mailing of hardcopy bills to  
customer premises, and automated telephone and service  
support staff to allow users access to billing and  
inventory data. As such, known arrangements have not  
otherwise tapped the potential for increased

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efficiency and convenience offered by a graphical user interface (GUI) via the Internet. Alternative arrangements have been introduced, but are typically packaged on a CD-ROM or diskette and are severely  
5 limited in capabilities to provide enhanced customer service. In other words, these known arrangements do not provide any drill down capability, entry of customer data, or comprehensive database access and management.

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### **Disclosure Of The Invention**

It is therefore an object of the present invention to provide a database report writer and customer data management system and method which increases convenience and efficiency of user access to  
15 billing information.

It is another object of the present invention to provide a database report writer and customer data management system and method which allows user access via the Internet using a GUI.

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It is yet another object of the present invention to provide a database report writer and customer data management system and method which allows a user to customize and save report definitions.

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It is a further object of the present invention to provide a database report writer and customer data management system method which allows direct on-line user access to billing and other related customer information to provide the ability or opportunity to

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eliminate the need for mailing of hardcopy billing reports.

5 In accordance with these and other objects,  
the present invention provides a database report  
writer and customer data management arrangement for  
convenient on-line access, such as via the Internet,  
to customer billing and inventory data. With the  
present invention, a user can analyze billing data for  
fraud control, internal auditing, inventory  
10 management, and cost accounting using an Internet  
browser and Internet capable computer terminal.  
Analysis is done by creating report definitions  
specifying the database data to display, sort,  
total/count, group, and selectively filter.

15 In accordance with a further aspect of the  
present invention, users can create custom database  
tables and input their own data therein. This data  
can be displayed in reports along with billing and  
inventory data. As a result, the present invention  
20 provides the ability to eliminate traditional hard  
copy reports such as a paper telephone bill mailed to  
each customer premise.

25 The above objects and other objects, fea-  
tures, and advantages of the present invention are  
readily apparent from the following detailed descrip-  
tion of the best mode for carrying out the invention  
when taken in connection with the accompanying draw-  
ings.

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### **Brief Description Of The Drawings**

FIGURE 1 is a block diagram of an Internet based database report writer and customer data management system in accordance with the present invention;

FIGURE 2 is a block diagram illustrating the overall process of the report writer in accordance with the present invention;

FIGURE 3 is a block diagram of a view editor in accordance with the present invention; and

FIGURE 4 is a block diagram of a data manager in accordance with the present invention.

### **Best Mode For Carrying Out The Invention**

Referring to Figure 1, an Internet based database report writer and customer data management system 10 in accordance with the present invention includes suitable programming to operate in conjunction with available Internet-type browser software. At least one customer/end user terminal 12 is connected to a host site 14 via a suitable Internet link on-line access 16.

In accordance with the present invention, an end user 12 can obtain from the host site one or more reports containing customer information stored in a database 18. In the preferred embodiment, such information relates to billing and other related customer data. In addition, interfacing between the

host site and an end user is preferably done using  
JAVA applets and HTML pages or equivalents thereof.  
However, this is not to be construed as limiting since  
the present invention can be used with any information  
5 delivery format capable of supporting a GUI type  
interface. As noted above, each user can access the  
views and reports using a conventional Internet  
browser.

The host site 14 includes front-end  
10 processor 20 for interfacing with the end users via  
the Internet connection. Front-end processor 20 can  
be implemented using any suitable web server hardware  
or other microprocessor based central terminal. The  
front-end logic generally operates to collect and  
15 transmit session information through the use of JAVA  
applets and HTML forms described below.

Figure 2 illustrates the overall process of  
a database report writer and customer data management  
arrangement 100 in accordance with the preferred  
20 embodiment. User access to arrangement 100 is  
provided through a main GUI type web page interface  
100. From this interface, the user can ~~use~~ access a  
view manager 102 hereinafter referred to as "Work with  
Views," or a data manager 104 hereinafter referred to  
25 as "Work with Data."

The Work with Views manager 102 is arranged  
to provide a graphical display of a list of the views  
a user can work with along with a set of function  
commands which can be used to manage the views. A  
30 "view" is a graphical container that stores a report  
definition. A report definition can be edited or

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created using a view editor 106 described in more detail below.

Using the Work with Views manager 102, a user can delete, run, create, edit, define a run-time filter for, extract data from, or determine the cost of running a view by selecting one of the set of predefined commands such as by double clicking with a mouse or similar input device associated function buttons graphically displayed on the Work with Views page.

The set of predefined commands provided by Work with Views manager 102 includes a directory tree type expand command 108 which expands a view by listing the reports stored therein. A delete command 110 is provided for deleting a view, which automatically deletes all reports contained therein, or an individual report within a view.

A run command 114 for running a view causes a table of contents to be displayed showing a list of all the reports contained within a selected view. Selecting a report from this list causes the report to be displayed in a predetermined area of the user display page.

A View Editor 106 allows the user to create new reports or edit existing ones. An edit command 112 is provided for selectively launching an uninitialized View Editor, or an initialized View Editor containing the definition of the report to be generated.

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More specifically, in the preferred embodiment, the View Editor 106 is an Internet based editor for defining report templates to selectively control the fields of data stored in an Oracle database table to be displayed in a particular report. Such database tables are commonly employed for storing customer data, and are not suitable for direct Internet access by a user. As further described, the View Editor 106 allows for customization and storing of unique report definitions, i.e., views, thereby providing flexibility in viewing the content of Oracle database tables over the Internet. Flexibility and ease of use allow an end user to produce accessed reports locally at a user terminal 12 without the host site, i.e., the billing information or service provider, having to generate a plurality of custom programs which create the reports for each end users.

View Editor 106 is arranged in accordance with known programming code to operate within an "off the shelf" Internet browser. View Editor 106 allows the user to define a format and content of a report containing data from Oracle database tables. The user selects the fields or types of data to be generated in a report by choosing the desired columns from a list of database tables, such as titled "Business Data," that are to be added to a report. The column(s) can be added before or after a column has already been added to the report, or added as the first or last column in the report. Appropriate commands are provided to indicate where to add the column, i.e., first, last, before, or after.

Data from more than one database table can

be included in the report by simply scrolling through a list of database tables displayed in the web page interface and selecting a column from the available table(s). If selected, the tables will be joined when  
5 the report is executed.

Referring now to Figure 3, the View Editor  
106 includes a plurality of command selections for implementing desired editing functions. These plurality of commands include a Data Item command 200,  
10 a Drill Down command 202, a Level command 204, a Sort command 206, and a Total command 208. In addition, an add command function 210 is provided to add selected columns to a report.

The drill down command 202 allows the user  
15 to identify which report to drill down to when the report is run. When the drill down command is selected, a list of views and corresponding reports within those views is displayed. The user selects the view or report to be drilled down.

The level command 204 is provided to allow  
20 grouping of data in the report. Level command 204 is used to launch a Detail command 212, a Group command 214, and a Grp+Det command 216 to allow a selected column to be used as a grouping column. This will  
25 cause a group line to be inserted in the generated report every time the value of the column changes. The group line will contain all columns assigned a level of "Group."

The report can also contain both group lines  
30 and detail lines. This feature is selected by

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launching Grp+Det command 216. The grouping function of level command 204 is disabled by launching Detail command 214.

Sort command 206 provides sorting of a  
5 selected column in either ascending or descending  
order. Total command 208 is used to total numeric  
columns or count nonnumeric columns. Launching this  
command causes the word "Total" to be graphically  
10 displayed if the column is numeric, or the word  
"Count" if the column is nonnumeric.

Headers and footers can be selectively  
created by entering text in predetermined entry fields  
located above and below the scrollable viewing area.  
The header will appear near the top of the report and  
15 the footer at the bottom.

In further accordance with the present  
invention, accessing a simple filter editor 218 allows  
quick and easy creation of a report content filter.  
More specifically, editor 218 is formed as a selection  
20 window for entry of custom filter values which operate  
as a threshold for comparison with database columns to  
selectively control which database rows will be  
included in a report. The filter created using the  
simple filter editor is preferably displayed  
25 graphically, such as in a window box titled "Business  
Data Filter."

For more complex filtering, a complex filter  
editor 220 can be accessed. The filter created using  
complex filter editor 220 is also preferably displayed  
30 in the box titled "Business Data Filter."

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After editing is complete, the user can then save the view or report. Once saved, a user can generate and receive a report using the saved view to access the desired data currently stored in the Oracle database.

A filter can be defined before running a report if the user wants to limit the amount of data a report will contain, such as by limiting the report to a particular date. Thus, the filter provides a mechanism for reducing the size of a report.

Referring again to the Work with Views manager 102, extracting a view or report causes all the data that would be contained in the body of the report(s) if generated to be downloaded to a file on the user's workstation. Copying a view or report allows the user to copy an existing view or report.

The cost of a running a view or report is determined by the amount of data contained therein if the report were to be generated. Launching this command preferably causes a window to be displayed containing this information.

The Work with Data manager 104 displays a current listing of custom database tables created by the user along with a set of function commands used to manage them. The user can insert data into a database table, delete data from a database table, delete an entire database table, browse an existing database table, or create a new database table.

More specifically, as shown in Figure 4, a

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table delete command 300 causes the table contents to be deleted as well the table definition itself. An insert command 302 allows insertion into a database table by entering a value for each column of the  
5 table. A browse command 304 causes a window to be displayed showing the contents of the database table. A row of the table can be selected for updating or deleting.

10 A create command 306 allows creation of a new table. The user enters a database table name and the name, type of data, length of data, and the number of decimal places (for numeric data) for each column of the database table being created.

15 Work with Data manager 104 allows a user to relate the customer billing and inventory data with data the customer provides and maintains. For example, a customer may use particular cost accounting codes which are assigned to particular telephone numbers to track telephony expenses. If a cost  
20 accounting table were created containing these codes along with the corresponding assigned telephone numbers, the customer could display this information along with the telephone numbers in a report. Alternatively, the telephony charges could be totaled  
25 using the assigned cost accounting, thereby allowing the customer to view billing data using the cost accounting codes as identification terms rather than the telephone number listed in the normal report.

30 While the best mode for carrying out the invention has been described in detail, those familiar with the art to which this invention relates will

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recognize various alternative designs and embodiments for practicing the invention as defined by the following claims.

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